

AMENDMENTS TO THE CLAIMS

1. (Original) A method, comprising:

applying a flux to a first surface of a substrate, the first surface of the substrate

having attached thereto solder bumps, the solder bumps having a melting

temperature, and the flux substantially comprising ingredients that have a

volatilization temperature less than the melting temperature;

generally aligning the solder bumps with corresponding metal bumps, the metal bumps

being attached to a first surface of a chip;

bringing the solder bumps into contact with the corresponding metal bumps; and

heating the solder bumps to a first temperature, the first temperature being equal

to or greater than the melting temperature.
2. (Original) The method of claim 1, wherein the first surface of the chip comprises

copper.
3. (Original) The method of claim 1, wherein the bringing of the solder bumps into

contact with the corresponding metal bumps, further includes applying a contact

force.
4. (Original) The method of claim 3, wherein the contact force is removed just after

the solder bumps have been heated to at least the melting temperature.
5. (Original) The method of claim 1, wherein the solder bumps are comprised of a

96.5% tin, 3.5% silver solder.

6. (Original) The method of claim 1, wherein the flux includes a carboxylic acid and has a volatilization temperature of approximately 200 degrees Celsius.
7. (Original) The method of claim 1, further comprising:
joining the solder bumps to the metal bumps by cooling the solder bumps to a
temperature below the melting temperature;
heating the first surfaces of the chip and substrate to within a temperature range,
the temperature range being equal to or greater than the volatilization
temperature but less than or equal to the melting temperature; and
maintaining the chip and substrate first surfaces within the temperature range for a
first period of time.
8. (Original) The method of claim 1, wherein the heating of the solder bumps
comprises heating the solder bumps through a second surface of the chip, the
second surface of the chip being opposite the first surface of the chip.
9. (Original) The method of claim 8, wherein the heating of the solder bumps to a
first temperature further includes rapidly increasing the temperature of the second
surface to a second temperature, the second temperature being greater than the
first temperature, wherein a temperature gradient is established through the chip
from the second surface at the second temperature to the first surface of the chip at
the first temperature.
10. (Original) The method of claim 8, wherein the heating of the solder bumps to the
first temperature comprises providing a heater in contact with the second surface.

11. (Original) The method of claim 9, wherein a third temperature at a second substrate surface opposite the first substrate surface is significantly below the first temperature, when the first surface of the chip is at the first temperature.
12. (Original) The method of claim 9, further comprises maintaining the second surface at the second temperature for a period of time.
13. (Original) The method of claim 12, wherein the period of time is approximately 1 to 5 seconds.

Claims 14-25 (Canceled)

26. (Original) A method, comprising:
 - providing a chip, the chip having an active surface comprised of a plurality of chip pads;
 - providing a substrate, the substrate having a top surface comprised of a plurality of substrate pads corresponding to the plurality of chip pads;
 - applying a first plurality of solder bumps or a first plurality of metal bumps to the plurality of chip pads;
 - applying a second plurality of solder bumps or a second plurality of metal bumps to the plurality of substrate pads, wherein the corresponding pluralities of chip and substrate pads do not both have a plurality metal bumps attached thereto;
 - substantially covering the solder bumps with a no-clean flux, the no-clean flux substantially consisting of components having volatilization temperatures

below a melting temperature;
generally aligning the plurality of chip pads and the plurality of substrate pads;
bringing the first plurality of solder bumps into contact with the second plurality
of metal bumps, and applying a contact force; and
heating the first plurality of solder bumps to a first temperature in excess of the
melting temperature.

27. (Original) The method of claim 26, wherein the first plurality of metal bumps are applied to the plurality of chip pads, and the second plurality of solder bumps are applied to the plurality of substrate pads.
28. (Original) The method of claim 26, wherein the first plurality of solder bumps are applied to the plurality of chip pads, and the second plurality of solder bumps are applied to the plurality of substrate pads.
29. (Original) The method of claim 26, wherein the first plurality of solder bumps are applied to the plurality of chip pads, and the second plurality of metal bumps are applied to the plurality of substrate pads.
30. (Original) The method of claim 26, further comprises heating the first plurality of solder bumps to the melting temperature at a rate in excess of 50 degrees Celsius per second.
30. (Original) The method of claim 26, further comprises heating the second plurality of solder bumps to the melting temperature at a rate in excess of 50 degrees Celsius per second.

Claims 32-39 (Canceled)